

Amendment and Response

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Serial No.: 09/651,217

Confirmation No.: 2006

Filed: August 30, 2000

For: METHODS FOR USE IN PACKAGING APPLICATION USING AN ADHESIVE COMPOSITION (As Amended)

Amendments to the Claims

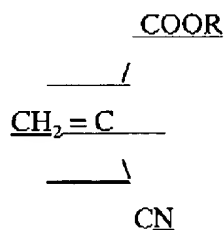
This listing of claims replaces all prior versions, and listings, of claims in the above-identified application:

1. **(Currently Amended)** A method for applying an adhesive to a wafer comprising:
providing a wafer having a surface; and

applying an instant setting adhesive composition on the surface of the wafer in a configuration wherein a plurality of portions of the surface have the instant setting adhesive composition applied thereon, and further wherein one or more zones of the surface are essentially free of the instant setting adhesive composition,

wherein the instant setting adhesive composition comprises:

an adhesive component selected from the group of a cyanoacrylate adhesive, an anaerobic acrylic adhesive, and mixtures thereof, wherein the adhesive component comprises a monomer of the formula:



wherein R is selected from the group of an alkaryl, a cycloalkenyl, an aralkyl, a 2-chlorobutyl group, a methallyl group, a crotyl group, and a 2-methoxyethyl group; and

at least one additive selected from the group of a thermal stabilizer, a thickener, a plasticizer, a toughener, a conductive filler, a dielectric additive, a moisture stabilizer, a curing inhibitor, an adhesion promoter, a storage stabilizer, a colorant, and an organic solvent;

wherein the instant setting adhesive composition has a thixotropic index from about 4 to about 6.

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2. **(Original)** The method of claim 1 further comprising singulating the wafer to form at least one die having the instant setting adhesive composition on at least a portion thereof.
3. **(Original)** The method of claim 2 wherein the zones comprise singulation streets.
4. **(Original)** The method of claim 1 wherein the zones comprise regions having exposed bond pads.
5. **(Original)** The method of claim 1 wherein applying the instant setting adhesive composition to the surface of the wafer comprises a technique selected from the group of screen printing, depositing and patterning, syringe applying, stenciling, dip coating, spraying, dot shooting, and combinations thereof.
6. **(Canceled)**
7. **(Original)** The method of claim 1 further comprising applying an adhesion promoter to the surface of the wafer prior to applying the instant setting adhesive composition.
- 8-9. **(Canceled)**
10. **(Currently Amended)** The method of claim 1 ~~wherein R is selected from the group of a methyl group, an ethyl group, an n-propyl group, an isopropyl group, an n-butyl group, an isobutyl group, a pentyl group, a hexyl group, an allyl group, a methallyl group, a crotyl group, a propargyl group, a cyclohexyl group, a benzyl group, a phenyl group, and a cresyl group, a 2-chlorobutyl group, a trifluoroethyl group, a 2-methoxyethyl group, a 2-methoxybutyl group and a 2-ethoxyethyl group.~~ wherein R is selected from the group of a methyl group, an ethyl group, an n-propyl group, an isopropyl group, an n-butyl group, an isobutyl group, a pentyl group, a hexyl group, an allyl group, a methallyl group, a crotyl group, a propargyl group, a cyclohexyl group, a benzyl group, a phenyl group, and a cresyl group, a 2-chlorobutyl group, a trifluoroethyl group, a 2-methoxyethyl group, a 2-methoxybutyl group and a 2-ethoxyethyl group.

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11. **(Previously Presented)** A method for applying an adhesive to a wafer comprising:
providing a wafer having a surface; and
applying an instant setting adhesive composition on the surface of the wafer in a configuration wherein a plurality of portions of the surface have the instant setting adhesive composition dispensed thereon and one or more zones are essentially free of the instant setting adhesive composition, wherein the instant setting adhesive composition has a thixotropic index from about 4 to about 6, and becomes non-flowable and substantially maintains the configuration in which the instant setting adhesive composition was applied within about 0.1 seconds to about 120 seconds at a temperature of about 20°C to about 30°C after the instant setting adhesive composition is applied to the surface.

12. **(Original)** The method of claim 11 wherein applying the instant setting adhesive composition comprises one of stenciling and screen printing.

13. **(Original)** The method of claim 11 wherein the instant setting adhesive comprises an adhesive component selected from the group of a cyanoacrylate adhesive, an anaerobic acrylic adhesive, and mixtures thereof.

14. **(Original)** The method of claim 11 wherein the one or more zones include singulation streets and regions having exposed bond pads and further comprising singulating the wafer along the singulation streets to form at least one die having the instant setting adhesive coated on at least a portion thereof.

15-21. **(Canceled)**

22. **(Currently Amended)** A method for use in packaging a die comprising:
providing a die;

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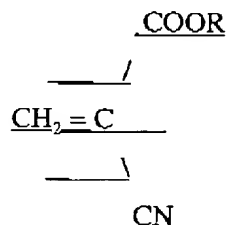
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providing a leadframe; and
 using an instant setting adhesive composition to attach the die to a portion of the leadframe,

wherein the instant setting adhesive composition comprises:

an adhesive component selected from the group of a cyanoacrylate adhesive, an anaerobic acrylic adhesive, and mixtures thereof, wherein the adhesive component comprises a monomer of the formula:



wherein R is selected from the group of an alkaryl, a cycloalkenyl, an aralkyl, a 2-chlorobutyl group, a methallyl group, a crotyl group, and a 2-methoxyethyl group; and

at least one additive selected from the group of a thermal stabilizer, a thickener, a plasticizer, a toughener, a conductive filler, a dielectric additive, a moisture stabilizer, a curing inhibitor, an adhesion promoter, a storage stabilizer, a colorant, and an organic solvent;

~~and further~~ wherein the instant setting adhesive composition has a thixotropic index from about 4 to about 6.

23. **(Original)** The method of claim 22 wherein the die includes the instant setting adhesive composition applied thereon.

24. **(Original)** The method of claim 22 wherein the leadframe includes the instant setting adhesive composition applied on at least a portion thereof.

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25. **(Original)** The method of claim 24 wherein the die includes the instant setting adhesive composition applied on a back surface of the die.
26. **(Original)** The method of claim 25 wherein the die includes the instant setting adhesive composition applied on at least a portion of a face surface of the die.
27. **(Original)** The method of claim 26 wherein the face surface of the die comprises exposed die bond pads.
28. **(Original)** The method of claim 22 further comprising using an instant setting adhesive composition comprising a conductive filler to form a heat sink; and attaching the heat sink to a portion of the die or the leadframe.
29. **(Original)** The method of claim 28 wherein the method further comprises assembling a package including the die and the leadframe, wherein the heat sink is attached to the package.
30. **(Currently Amended)** ~~The method of claim 22 wherein the method further comprises~~
for use in packaging a die comprising:
providing a die;
providing a leadframe;
using an instant setting adhesive composition to attach the die to a portion of the
leadframe, wherein the instant setting adhesive composition comprises an adhesive component
selected from the group of a cyanoacrylate adhesive, an anaerobic acrylic adhesive, and mixtures
thereof and further wherein the instant setting adhesive composition has a thixotropic index from
about 4 to about 6; and
applying an encapsulant on portions of the die attached to the leadframe, wherein the encapsulant comprises an instant setting adhesive composition.

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31. **(Previously Presented)** The method of claim 22 wherein using the instant setting adhesive composition comprises attaching a plurality of lead fingers of the leadframe to the die, wherein the lead fingers include the instant setting adhesive composition applied on at least a portion thereof.
32. **(Previously Presented)** The method of claim 22 wherein using the instant setting adhesive composition comprises attaching the die to a mounting paddle, wherein the mounting paddle includes the instant setting adhesive composition applied on at least a portion thereof.
33. **(Previously Presented)** The method of claim 22 wherein using the instant setting adhesive composition comprises using a technique selected from the group of screen printing, depositing and patterning, syringe applying, stenciling, dip coating, spraying, dot shooting, and combinations thereof to apply the instant setting adhesive composition.
34. **(Currently Amended)** A method for use in packaging a die comprising:
providing a die;
providing a leadframe; and
using an instant setting adhesive composition to attach the die to a portion of the leadframe under pressure and a temperature of about 200°C or less,
wherein the instant setting adhesive composition comprises:
an adhesive component selected from the group of a cyanoacrylate adhesive, an anaerobic acrylic adhesive, and mixtures thereof, wherein the adhesive component comprises a monomer of the formula:

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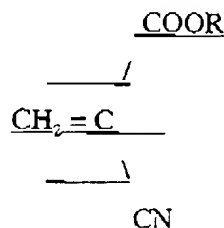
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wherein R is selected from the group of an alkaryl, a cycloalkenyl, an aralkyl, a 2-chlorobutyl group, a methallyl group, a crotyl group, and a 2-methoxyethyl group; and

at least one additive selected from the group of a thermal stabilizer, a thickener, a plasticizer, a toughener, a conductive filler, a dielectric additive, a moisture stabilizer, a curing inhibitor, an adhesion promoter, a storage stabilizer, a colorant, and an organic solvent;

wherein the instant setting adhesive composition has a thixotropic index from about 4 to about 6.

35. (Original) The method of claim 34 wherein the die includes the instant setting adhesive composition applied thereon.
36. (Original) The method of claim 34 wherein the leadframe includes the instant setting adhesive composition applied on at least a portion thereof.
37. (Original) The method of claim 36 wherein the die includes the instant setting adhesive composition applied on a back surface of the die.
38. (Original) The method of claim 34 wherein the die includes the instant setting adhesive composition applied on at least a portion of a face surface of the die.

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39. **(Original)** The method of claim 38 wherein the face surface of the die comprises exposed die bond pads.
40. **(Original)** The method of claim 34 further comprising using an instant setting adhesive composition comprising a conductive filler to form a heat sink; and attaching the heat sink to a portion of the die or the leadframe.
41. **(Original)** The method of claim 40 wherein the method further comprises assembling a package including the die and the leadframe, wherein the heat sink is attached to the package.
42. **(Currently Amended)** ~~A~~The method of claim 34 wherein the method further comprises for use in packaging a die comprising:
providing a die;
providing a leadframe;
using an instant setting adhesive composition to attach the die to a portion of the leadframe under pressure and a temperature of about 200°C or less; and
applying an encapsulant on portions of the die attached to the leadframe, wherein the encapsulant comprises an instant setting adhesive composition.
43. **(Previously Presented)** The method of claim 34 wherein using the instant setting adhesive composition comprises attaching a plurality of lead fingers of the leadframe to the die, wherein the lead fingers include the instant setting adhesive composition applied on at least a portion thereof.
44. **(Previously Presented)** The method of claim 34 wherein using the instant setting adhesive composition comprises attaching the die to a mounting paddle, wherein the mounting paddle includes the instant setting adhesive composition applied on at least a portion thereof.

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45. **(Previously Presented)** The method of claim 34 wherein using the instant setting adhesive composition comprises using a technique selected from the group of screen printing, depositing and patterning, syringe applying, stenciling, dip coating, spraying, dot shooting, and combinations thereof to apply the instant setting adhesive composition.

46. **(Currently Amended)** A method for attaching a semiconductor die to a leadframe comprising:

providing an instant setting adhesive composition ~~including an adhesive component selected from the group of a cyanoacrylate adhesive, an anaerobic acrylic adhesive, and mixtures thereof;~~

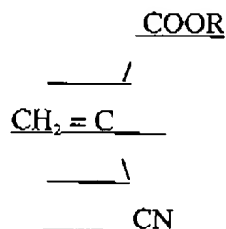
applying the instant setting adhesive composition on at least a portion of a wafer including a plurality of dice; and

singulating dice from the wafer; and

attaching a die having the instant setting adhesive composition applied on at least a portion thereof to a portion of a leadframe,

wherein the instant setting adhesive composition comprises:

an adhesive component selected from the group of a cyanoacrylate adhesive, an anaerobic acrylic adhesive, and mixtures thereof, wherein the adhesive component comprises a monomer of the formula:



wherein R is selected from the group of an alkaryl, a cycloalkenyl, an aralkyl, a 2-chlorobutyl group, a methallyl group, a crotyl group, and a 2-methoxyethyl group; and

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at least one additive selected from the group of a thermal stabilizer, a thickener, a plasticizer, a toughener, a conductive filler, a dielectric additive, a moisture stabilizer, a curing inhibitor, an adhesion promoter, a storage stabilizer, a colorant, and an organic solvent;

wherein the instant setting adhesive composition has a thixotropic index from about 4 to about 6.

47. **(Original)** The method of claim 46 wherein the portion of the leadframe comprises a mounting paddle and the surface of the wafer comprises a back surface of the wafer.

48. **(Original)** The method of claim 46 wherein applying the instant setting adhesive composition comprises applying the instant setting adhesive composition in a pattern on the wafer, the pattern including the instant setting adhesive composition on regions of the wafer such that singulation streets and bond pads being essentially free of the instant setting adhesive composition.

49. **(Previously Presented)** The method of claim 46 wherein attaching the die on a portion of the leadframe comprises:

positioning a portion of the die having the instant setting adhesive composition thereon adjacent to the portion of the leadframe; and

applying pressure at an elevated temperature to attach the die to the leadframe.

50. **(Original)** The method of claim 49 wherein the elevated temperature is about 200°C or less.

51. **(Original)** The method of claim 46 wherein the portion of the leadframe comprises one or more lead fingers of a lead on chip leadframe and the surface of the wafer comprises a face surface of the wafer.

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52. **(Original)** The method of claim 46 wherein the portion of the leadframe comprises one or more lead fingers and the surface of the wafer comprises a back surface of the wafer.

53. **(Currently Amended)** A method for attaching a semiconductor die to a leadframe comprising:

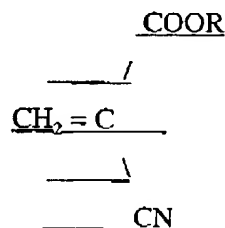
dispensing an instant setting adhesive composition on the leadframe, ~~the instant setting adhesive composition comprising an adhesive component selected from the group of a cyanoacrylate adhesive, an anaerobic acrylic adhesive, and mixtures thereof;~~

placing the die in contact with the instant setting adhesive composition; and

forming a bond between the die and the leadframe with the instant setting adhesive composition,

wherein the instant setting adhesive composition comprises:

an adhesive component selected from the group of a cyanoacrylate adhesive, an anaerobic acrylic adhesive, and mixtures thereof, wherein the adhesive component comprises a monomer of the formula:



wherein R is selected from the group of an alkaryl, a cycloalkenyl, an aralkyl, a 2-chlorobutyl group, a methallyl group, a crotyl group, and a 2-methoxyethyl group; and

at least one additive selected from the group of a thermal stabilizer, a thickener, a plasticizer, a toughener, a conductive filler, a dielectric additive, a moisture stabilizer, a curing inhibitor, an adhesion promoter, a storage stabilizer, a colorant, and an organic solvent;

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wherein the instant setting adhesive composition has a thixotropic index from about 4 to about 6.

54. **(Original)** The method of claim 53 further comprising applying a catalyst to the leadframe, die or to the instant setting adhesive composition prior to forming the bond between the die and the leadframe.

55. **(Original)** The method of claim 53 wherein the leadframe includes a mounting paddle.

56. **(Original)** The method of claim 53 wherein the leadframe comprises a lead-on-chip leadframe.

57. **(Currently Amended)** A method for attaching a semiconductor die to a leadframe comprising:

providing the leadframe with a mounting paddle;

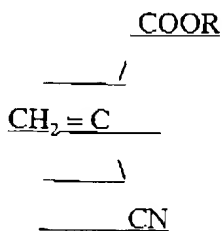
dispensing an instant setting adhesive composition on the mounting paddle;

placing a die in contact with the instant setting adhesive composition; and

applying pressure at a temperature of about 200°C or less to bond the die to the leadframe with the instant setting adhesive composition.

wherein the instant setting adhesive composition comprises:

an adhesive component selected from the group of a cyanoacrylate adhesive, an anaerobic acrylic adhesive, and mixtures thereof, wherein the adhesive component comprises a monomer of the formula:



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wherein R is selected from the group of an alkaryl, a cycloalkenyl, an aralkyl, a 2-chlorobutyl group, a methallyl group, a crotyl group, and a 2-methoxyethyl group; and

at least one additive selected from the group of a thermal stabilizer, a thickener, a plasticizer, a toughener, a conductive filler, a dielectric additive, a moisture stabilizer, a curing inhibitor, an adhesion promoter, a storage stabilizer, a colorant, and an organic solvent;

wherein the instant setting adhesive composition has a thixotropic index from about 4 to about 6.

58. (Canceled)

59. (Previously Presented) The method of claim 57 wherein dispensing the instant setting adhesive composition comprises a method selected from the group consisting of screen printing, depositing and patterning, syringe applying, stenciling, dip coating, spraying, dot shooting, and combinations thereof.

60. (Previously Presented) The method of claim 57 wherein dispensing the instant setting adhesive composition comprises forming a pattern of dots.

61. (Canceled)

62. (Currently Amended) A method for attaching a lead-on-chip semiconductor die to a lead-on-chip leadframe comprising:

providing the leadframe with a plurality of lead fingers configured to form a die mounting area;

dispensing an instant setting adhesive composition on the lead fingers in the die mounting area, ~~said instant setting adhesive composition comprising an adhesive component selected from the group of a cyanoacrylate adhesive, an anaerobic acrylic adhesive, and mixtures thereof and an electrically insulating filler;~~

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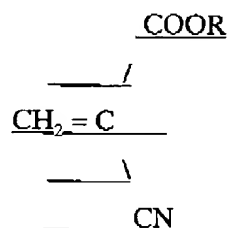
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placing the die in contact with the instant setting adhesive composition; and
 forming a bond between the die and the lead fingers with the instant setting adhesive composition,

wherein the instant setting adhesive composition comprises:

an adhesive component selected from the group of a cyanoacrylate adhesive, an anaerobic acrylic adhesive, and mixtures thereof, wherein the adhesive component comprises a monomer of the formula:



wherein R is selected from the group of an alkaryl, a cycloalkenyl, an aralkyl, a 2-chlorobutyl group, a methallyl group, a crotyl group, and a 2-methoxyethyl group; and

an electrically insulating filler;

wherein the instant setting adhesive composition has a thixotropic index from about 4 to about 6.

63. **(Original)** The method of claim 62 further comprising applying a catalyst to the lead fingers, die or the instant setting adhesive composition prior to the placing step.

64-82. **(Canceled)**

83. **(Currently Amended)** A method for applying an adhesive to a wafer comprising:
 providing a wafer having a surface; and
 applying an instant setting adhesive composition onto a plurality of portions of the surface of the wafer in a configuration,

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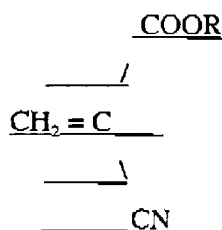
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wherein the instant setting adhesive composition comprises:an adhesive component selected from the group of a cyanoacrylate adhesive, an anaerobic acrylic adhesive, and mixtures thereof, wherein the adhesive component comprises a monomer of the formula:wherein R is selected from the group of an alkaryl, a cycloalkenyl, an aralkyl, a 2-chlorobutyl group, a methallyl group, a crotyl group, and a 2-methoxyethyl group; andat least one additive selected from the group of a thermal stabilizer, a thickener, a plasticizer, a toughener, a conductive filler, a dielectric additive, a moisture stabilizer, a curing inhibitor, an adhesion promoter, a storage stabilizer, a colorant, and an organic solvent;wherein the instant setting adhesive composition has a thixotropic index from about 4 to about 6, and

wherein the instant setting adhesive composition becomes non-flowable and substantially maintains the configuration in which the instant setting adhesive composition is applied within about 0.1 seconds to about 120 seconds after the instant setting adhesive is applied to the surface.

84. (Previously Presented) The method of claim 83 wherein the instant setting adhesive composition becomes non-flowable and substantially maintains the configuration within about 0.1 seconds to about 60 seconds.

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85. **(Previously Presented)** The method of claim 83 wherein the instant setting adhesive composition becomes non-flowable and substantially maintains the configuration within 0.1 seconds to 120 seconds at a temperature of about 20°C to about 30°C.

86. **(Previously Presented)** The method of claim 83 wherein one or more zones of the surface are essentially free of the instant setting adhesive composition, and further wherein the zones comprise singulation streets.

87. **(Previously Presented)** The method of claim 83 wherein one or more zones of the surface are essentially free of the instant setting adhesive composition, and further wherein the zones comprise regions having exposed bond pads.

88. **(Previously Presented)** The method of claim 83 wherein applying the instant setting adhesive composition to the surface of the wafer comprises a technique selected from the group of screen printing, depositing and patterning, syringe applying, stenciling, dip coating, spraying, dot shooting, and combinations thereof.

89-90. **(Canceled)**

91. **(Previously Presented)** The method of claim 11 wherein the instant setting adhesive composition becomes non-flowable and substantially maintains the configuration within about 0.1 seconds to about 60 seconds.

92. **(Canceled)**